A USER SUPPORT APPARATUS AND SYSTEM USING AGENTS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a user support technique, and it particularly relates to a user support system that supports users' processes such as an operation and an information retrieval using agents.

2. Description of the Related Art

With the widespread use of the Internet and mobile phones, more and more people are using personal computers and various types of information terminals. In recent years, sales of electronic equipment such as personal computers have been greatly increasing, and as a result beginners or persons who lack computer literacy have rapidly increased in number. With the remarkable improvement in CPU power, memory capacity and graphical user interface or GUI, such novices have been provided with a method which allows them to operate their equipment easily. Without such aids as GUI and the like, the novice is unable to utilize many advanced functions of the equipment and to access necessary information properly.

As one such user support technology, an agent technology is known and is in use. An agent is basically a

personified character that appears on a computer display, obtains a user's utterance, and transfers the utterance to the computer. The result of processes in the computer is presented to the user as an utterance from the agent. With the presence of the agent, the inexperienced user can be relieved of a sense of awkwardness when he/she works with the computer and can feel as though the computer is talking to him/her.

On the other hand, it demands a very great effort for a system administrator to manage and refine an agent system properly. As the user is a human being, the range of his/her utterances is almost infinite. Although it is impossible to anticipate all of these utterances and prepare for real utterances produced by the user, it is possible that the user may expect that the agent can accurately understand any utterances he/she might make and give quick and proper responses to them. Even if a substantial amount of the user utterances is anticipated, it is a very hard task to search and identify the words expressed by the user in a very short response time close to real-time. Moreover, as the number of the anticipated utterances increases, the load on the server that controls the agent also increases, as it must handle a larger amount of data.

SUMMARY OF THE INVENTION

The present invention has been made with a view to the above-mentioned problems, and an object thereof is to provide a user support technology by means of which an agent can give a quick response to a wide range of user utterances and requests. Another object of the present invention is to provide an agent technology by which the responses of agents can be continuously and effectively enhanced in respect to accuracy and flexibility.

According to one aspect of the present invention, a user support system is provided. The system comprises a first block which has an electronic collection of user utterances, and identifies a content of a given user utterance, and a second block which has an electronic collection of action patterns for an agent for responding to user utterances, and enables the agent to respond to the user utterances. The user utterance collection and the agent action collection are separately constructed by configuring the first block and the second block separately. In this configuration the user utterance collection and the agent action collection can be accessed independently, and thereby the process of identifying the user utterances and the process of determining the agent responses can be executed in parallel.

The agent is not always a visible character but the agent here may also means a user support program that is

itself invisible from the user or other functions such as a back-end process in the system. The action patterns of the agent include the agent utterances, images, behaviors, or any other processes related to supporting users. The utterance of the user and the agent is not only made in a voice, but also given in text data. The utterance may include oral or spoken words or sentences that can be converted to text data by speech recognition.

The system may include a plurality of the second blocks, and each of the second blocks may offer a specialized service to the user. For instance, the first block and the plurality of the second block may be configured as different nodes in a network and communicate with the user via the network. In this case, user may be a client and the first and second blocks may be servers, and thus a client-server system can be configured.

The first block may be an entrance or portal server to identify the user utterances, and an appropriate one of the second blocks may be selected according to the content of the identified user utterance. The second blocks may be provided for each service category, such as news, fortune telling, travel, cooking, business, health and so on. In this case, since each second block has a specific theme, the agent on each second block can be easily maintained and refined. In addition, since the utterances on different topics are processed on different nodes, the system load

can be distributed and balanced among the nodes.

The first block may include an utterance search unit which searches the utterance of the user in the user utterance collection, and a reporting unit which notifies a system administrator when the user utterance is not found in the user utterance collection. The administrator can answer to the user or revise the user utterance collection and the agent action collection.

The system may further comprise a recording unit that obtains a record of the user's access to the system. The second block may chooses one from a plurality of choices of the actions of the agent to respond to the user utterance depending on a situation of the user's access.

The first block may further include an index storing unit that stores an index of contents of the user utterance collection. The search unit can initially perform an index-search for the given user utterance to narrow the search scope and the search speed can be improved.

The search unit may perform a full text search for the user utterance. The full text search here means that the user utterance is matched with all utterances registered in the user utterance collection and compared on a full text basis. Although the full text search can be performed independently from the index search, the index search may be preferably performed to narrow the search scope before the full text search. In other words, the

system designer can register many user utterances without caring about their similarity and as a result the given user utterance could be easily searched by the full text search. By using the full text search to identify the user utterances, user's intention can be identified with high accuracy and the agent's response can be very accurate. Thus, the index search and the full text search can allow the volume of the user utterance collection to increase without sacrificing the system performance.

Still another object of the present invention is to provide a translation system as a communication tool with great convenience and excellent performance.

According to one aspect of the present invention, a translation system is provided. The system comprises a first block which has an electronic collection of user utterances, and identifies a content of a given user utterance, and a second block which has an electronic dictionary file for translating the user utterance, and provides the user with an expression corresponding to the utterance in another language. The first block and the second block are configured as different nodes accessing a network so that the user utterance collection and the dictionary file are separately constructed. The first block may be called an entrance server since it receives the user utterance, while the second block may be called a translation server since it is in charge of the translation.

The translation server may be divided into a plurality of servers and each server may deal with each specialized field. For instance, the servers may be separately configured for each of topics such as scientific technology, daily conversation, politics and economy, or the like. The entrance server may judge which server is most appropriate to the user utterance.

In order to distribute the processes of identifying and translating the user utterance, the first and the second blocks are separately configured as different network nodes. The first and the second blocks may be configured as servers that the user terminal accesses. Such distributed processing can improve the overall performance of the system. Such distributed system is easy to maintain and enhance. If the translation servers are provided for each specialized field, each of the servers can be maintained independently.

The corresponding expression is, for instance, an English translation "Good morning" of a Japanese utterance "Ohayo". The system may include a target language setting unit that enables the user to sets a translation language or a target language.

The first block may include an utterance search unit which searches the utterance of the user in the user utterance collection, and a reporting unit which notifies a system administrator when the user utterance is not found

in the user utterance collection. Thereby the administrator can revise the user utterance collection and the dictionary file.

According to another aspect of the present invention, a translation system is also provided. The system comprises an electronic collection of user utterances, an utterance search unit which identifies a content of a given user utterance using the user utterance collection, a dictionary file which describes correspondence between multiple languages for anticipated utterances of the user, a function block which offers a predefined service to the user, a target language setting unit which sets a language that is used by any number of users who assemble virtually to receive the offered service as a target language for translation, and a corresponding expression search unit which compares a content of an utterance given by any one of said users, which is identified by the utterance search unit, with the dictionary file and identifies an expression corresponding to the utterance in the target language. The function block offers the corresponding expression embedded in said service.

The predefined service includes any services in which a translation between multiple languages can be utilized. The users who assemble virtually to receive the offered service may be a plurality of users who join a chat service in the Internet by accessing a predefined Web page to

receive the service. The language used by such users may be their mother tongue.

In this aspect of the present invention, when a user makes an utterance, it is translated to a corresponding expression in a target language and embedded into the service. Therefore each of the users of the system can receive the service in his/her mother tongue. The system can be applied to a chat service shared by people speaking different languages or a network RPG or role-playing game in which many users from different countries can participate. The system can be also applied a system that only one user uses, such as an on line shopping or a ticket booking service offered in a foreign language.

The function block may customize the service for each user on a target language basis, by embedding a corresponding expression in each user's mother tongue into the service offered to each user. If a user is multinational and speaks five languages, there could be five corresponding expressions but the service may be sufficiently offered to the user in his/her mother tongue only.

According to yet another aspect of the present invention, a user support apparatus is provided. The apparatus comprises a first block which has an electronic collection of user utterances, and identifies a content of a given user utterance, and a second block which has an

electronic collection of action patterns for an agent for responding to user utterances, and enables the agent to respond to the user utterances. The user utterance collection includes a general utterance library that stores general user utterances and a specialized utterance library that stores utterances related to a specialized field of the agent.

The general utterance library may be configured as a natural language library such as a dictionary for a kana-to-kanji converting system in a Japanese word processor. It is not necessary to provide the general utterance library and the specialized utterance library separately, but both the libraries may be united as a one library.

Another aspect of the present prevention is a user support system. In the system, a plurality of the user support apparatus is provided according to each said specialized field, and the plurality of the user support apparatus are connected to a network as separate network nodes, and each node is so configured as to be accessible from the user.

A server that includes the specialized utterance libraries of all the user support apparatus within the user support system may be provided. This server may be an entrance server or a portal server that can identify all user utterances to be processed at the user support system. An appropriate server for responding to the user utterance

may be selected according to the content of the utterance identified by the server.

Still another object of the present invention is to provide a user support technology by means of which a user can get desired information in a friendly environment and desired processes can be smoothly executed on a computer or other apparatus.

According to one aspect of the present invention, a user support apparatus is provided. The apparatus comprises an utterance identification block which has an electronic collection of user utterances, and identifies a content of a given user utterance, and a response block which has an electronic collection of action patterns for a first agent for responding to user utterances, and enables the first agent to respond to the user utterances. The utterance identification block has an additional collection of anticipated utterances to which the first agent should react among utterances that a second agent make to the user, and identifies a content of an utterance of the second agent if the utterance of the second agent exists in the additional utterance collection, and the response block has an additional collection of action patterns for the first agent for reacting to the utterances of second agent, and enables the first agent to occasionally react to the utterances of the second agent.

The agent here is a generic name of a function for

supporting a user to search information or navigating the user to access desired information, and the function mainly enables a personified character to appear on a screen and converse with the user. The first agent is implemented on the user support apparatus and acts inside the user support apparatus, while the second agent may act outside the user support apparatus. While the second agent and the user converse, the first agent can react if the conversation is related to his interests, even when the first agent is not talking with the user.

Another aspect of the present invention is a user support system. In the system, a plurality of the user support apparatus is provided according to each specialized field, and the plurality of the user support apparatus are connected to a network as separate network nodes, and the additional utterance collection, the agent action collection, and the additional action collection of each user support apparatus are generated according to each specialized field.

In this system, the plural user support apparatus may include the respective response blocks therein and share the utterance identification block at any one of the network nodes. In this configuration, the shared utterance identification block may include the user utterance collections of all other apparatuses.

In this system, each user support apparatus may

include the first agent on the apparatus, and if the first agent appears on any other apparatus, the first agent may act as a second agent on said other apparatus.

Moreover, any arbitrary combination of the above-mentioned structural components in the present invention is still effective as an embodiment when applied as a method, a system, a server, a terminal or a computer program, and so forth.

This summary of the invention does not necessarily describe all necessary features, so that the invention may also be a sub-combination of these described features.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an overall structure of a network system including a user support system according to the first embodiment.

Fig. 2 is an internal structure of an originating server in a user support system.

Fig. 3 is an internal structure of an index file in an originating server.

Fig. 4 is an internal structure of a user utterance collection in an originating server.

Fig. 5 is an internal structure of an access information file in an originating server.

Fig. 6 is an internal structure of a chat server in a

user support system.

Fig. 7 is an internal structure of a user terminal to utilize a user support system.

Fig. 8 shows a local agent displayed on a screen when a user has activated a user terminal.

Fig. 9 shows a chat agent displayed on a screen when a user makes an utterance.

Fig. 10 shows a menu agent displayed on a screen when a user asks for a recipe.

Fig. 11 shows how a recipe agent requests a user to give a hint to narrow a search scope.

Fig. 12 shows how a recipe agent presents a search result to a user.

Fig. 13 is an overall structure of a network system including a translation system according to the second and the third embodiments.

Fig. 14 is an internal structure of an entrance server as the first block of the second embodiment.

Fig. 15 is an internal structure of a user utterance collection in an entrance server.

Fig. 16 is an internal structure of a translation server as the second block of the second and the third embodiments.

Fig. 17 is a data structure of a dictionary file in a translation server.

Fig. 18 shows a screen displayed when a user accesses

an entrance server to receive a translation service.

Fig. 19 shows a screen displayed when a user accesses a translation server.

Fig. 20 is a flow chart showing a translation procedure according to the second embodiment.

Fig. 21 is an internal structure of an entrance server according to the third embodiment.

Fig. 22 illustrates a Japanese version of a screen of a multilingual chat service according to the third embodiment.

Fig. 23 illustrates an English version of a screen of a multilingual chat service according to the third embodiment.

Fig. 24 is an overall structure of a network system including a user supporting system according to the fourth embodiment.

Fig. 25 is an internal structure of an originating server in a user support system.

Fig. 26 is an internal structure of an index file in an originating server.

Fig. 27 is an internal structure of a user utterance collection in an originating server.

Fig. 28 is an internal structure of an access information file in an originating server.

Fig. 29 is an internal structure of an agent action collection in an originating server.

Fig. 30 is an overall structure of a network system including a user support system according to the fifth embodiment.

Fig. 31 is an internal structure of an originating server in a user support system.

Fig. 32 is an internal structure of an additional index file in an originating server.

Fig. 33 is an internal structure of an additional utterance collection in an originating server.

Fig. 34 shows a local agent displayed on a screen when a user has activated a user terminal.

Fig. 35 shows a chat agent displayed on a screen when a user makes an utterance.

Fig. 36 shows a recipe agent displayed on a screen when a user asks for a recipe.

Fig. 37 shows how a recipe agent presents a search result to a user.

Fig. 38 shows a travel agent displayed on a screen.

Fig. 39 is an overall structure of a user support apparatus according to the sixth embodiment.

Fig. 40 is an overall structure of a user support apparatus according to the seventh embodiment.

DETAILED DESCRIPTION OF THE INVENTION

The invention will now be described on the basis of

the preferred embodiments, which do not intend to limit the scope of the present invention, but exemplify the invention. All of the features and the combinations thereof described in the embodiment are not necessarily essential to the invention.

Fig. 1 shows an overall structure of a network system 10 including a user support system 16 according to the first embodiment of the present invention. Here a user terminal 12 and a user support system 16 are connected to each other via the Internet 14. The user terminal 12 is a personal computer, a PDA or personal digital assistant, a mobile phone with access to the Internet 14, or any other suitable item of hardware.

The user support system 16 includes an originating server 20, a chat server 24 and a recipe server 26. The originating server 20 is the first processing block, and both the latter two servers are the second processing blocks. These three servers are connected to the Internet 14. Thus, the originating server 20, the chat server 24, and the recipe server 26 are configured as separate network nodes, and therefore the processes of user utterances and agent utterances can be distributed among the servers. Since an agent performing in a different field can be also implemented in a different node, maintenance can easily be carried out on each of the agents. The names "chat server" and "recipe server" are given according to an allotted

field or a specialized field of the agent. In the following, such servers as the chat server 24 and the recipe server 26 are each generally referred to as a specialized server, and agents placed on these servers are referred to as expert agents. Although the user support system 16 may be configured as one unit or apparatus, for instance as one component inside a portal site, it is assumed in the following that the system is configured as separate nodes and the originating server 20 serves as a portal server for the user terminal 12.

Although full details are given below, the abstract of the process in Fig. 1 is as follows. When the user activates the user terminal 12, a local agent implemented inside the user terminal 12 appears on its screen. The local agent waits for the first utterance of the user. This utterance is referred to as a process starting utterance in the following. The process starting utterance is transmitted to the originating server 20 via the Internet 14. At that time, the user terminal 12 displays a Web page of the originating server 20 on a WWW browser.

The originating server 20 has a collection of user utterances, that is a collection of utterances that users are expected or anticipated to produce. The process starting utterance is matched with the collection and the content of the utterance is recognized. As a result, an expert agent appropriate to respond to the process starting

utterance is identified and the URL of its specialized server, as denoted by URLa and URLb in the figure, is sent to the browser of the user terminal 12. When the user terminal 12 obtains the URL, a Web page of the specialized server is displayed on the screen, and the expert agent appears. The specialized server contains a collection of action patterns for the expert agent, and responds to the process starting utterance and subsequent user utterances, which are referred to as normal utterances. Although utterances of the agent are mainly considered as the agent behavior in the following, the agent may respond to the user through a gesture or other actions, or may respond by changing the color or texture of its image, or performing a search or any other program processes.

When the user makes a new utterance, that is a normal utterance, to the expert agent, the utterance is captured and sent to the originating server 20, as denoted by URLs in the figure. The originating server 20 identifies again an expert agent to respond to the utterance, and then transmits the URL of its specialized server to the user terminal 12. Again, the following sequence is repeated:

1. the originating server 20 identifies a user utterance;

2. the originating server 20 identifies a specialized server appropriate to the identified utterance;

3. an expert agent on the specialized server responds to the user; and

4. the expert agent requests or prompts the user to make a normal utterance.

Thus, the process always returns to the originating server 20 and then restarts from there. It is for this reason that the server is named the originating server.

Fig. 2 shows an internal structure of the originating server 20. In this figure, "H" indicates utterance data, "I" an index search of the utterance, "F" a file name having the URL of a specialized server to respond to the utterance of the user, and "X" an unidentified utterance, respectively. The structure shown in Fig. 2 may be implemented with a CPU, memory and a program loaded in the memory. In the figure, however, the blocks are not divided in terms of hardware and/or software components, but in terms of function. The skilled in the art can therefore understand that the various combinations of hardware and software components can achieve the function of these blocks. The same consideration is applied to the whole specification.

A communication unit 30 communicates with the specialized server and the user terminal 12 via the Internet 14. An utterance obtaining unit 32 captures an utterance from a user and sends it to an utterance search unit 34. The utterance search unit 34 initially checks the

first character of the utterance with an index file 36 to search by index, and then identifies the content of the utterance by conducting a phrase search through the whole utterance. The phrase search is a process of finding any phrase that matches the utterance not only by word but also by phrase. If no corresponding phrase is found, the utterance is divided into morphemes and a closely related expression is searched for by key word or word.

The index file 36 is generated by arranging the anticipated utterances stored in a user utterance collection 38 in the order of the Japanese syllabary. Since the first character of the utterance is checked with this index file 36, the search for the utterance can be conducted with great speed, even if the user utterance collection 38 is very large. As described below, since the user utterance collection can easily be enhanced in this embodiment, the utterance collection 38 can be greatly increased in size. In this respect, the speed gained by the initial index search is highly advantageous.

When an utterance is identified using the index file 36, a file descriptor of a file describing information such as a URL of a specialized server that should respond to the utterance is identified in the index file 36, and the file itself built into the user utterance collection 38 is opened and the proper URL obtained. The user utterance collection 38 has one file devoted to each utterance. The

URL obtained is forwarded to the browser of the user terminal 12 via the communication unit 30 and the user terminal 12 in turn accesses the specialized server. Strictly speaking, the URL does not point to a general Web page of the specialized server, but a personalized page to respond to the utterance of the user. One page is allocated to one utterance, and in some cases, multiple pages are allocated to one utterance. The latter cases are described below.

A statement exactly corresponding to the utterance of the user may not always have been previously stored in the user utterance collection 38. Especially in the process of enhancing the user utterance collection 38, a perfectly corresponding statement may not be found. In this case, the utterance search unit 34 breaks down the user utterance into morphemes by a known method and finds the most probable utterance from the user utterance collection 38 by re-searching employing a logical AND of nouns of morphemes or similar processes. Each utterance for which a re-search is conducted and each utterance for which the re-search is not successful is recorded as an unidentified utterance in an unidentified utterance file 40, and an administrator of the originating server 20 is notified of this via the communication unit 42 in an electronic mail or the like. The administrator registers anew such unidentified utterances and the URL of a page of a specialized server

that should respond to the utterance in the user utterance collection 38, and registers the indexes of the utterance in the index file 36, and then finally designs processes including utterances for the expert agent on that page. For this kind of maintenance, the unidentified utterance can be added straight to the user utterance collection 38 and no complicated process is involved. Therefore it is a very easy task to enhance the user utterance collection 38.

An access record unit 44 records the status of each user's accessing of the specialized server in an access information file 46. This enables the expert agent to respond differently to identical user utterances. For instance, when a user who first visits the chat server 24 says "Hello", the expert agent of the chat server 24, also referred to as a chat agent, will say "Nice to meet you". On the other hand, if the user visits the chat server 24 again, the chat agent can say "Hello. How's it going?" and so on. Therefore, a certain sensitivity of response can be realized. The access record unit 44 notifies the utterance search unit 34 of the user's access status. If multiple pages of the specialized server are employed in the user utterance collection 38 in order to respond to a user utterance, as in this example, the utterance search unit 34 chooses an appropriate page under the user access status and sets the URL of the chosen page on the browser of the user terminal 12.

Fig. 3 is an internal structure of the index file 36. Fig. 4 is an internal structure of the user utterance collection 38. The index file 36 has a Japanese syllabary column 100, a user utterance column 102, and a file name column 104. The user utterances are arranged in the order of the Japanese syllabary. If the first character is "A", the utterance is categorized corresponding to "A" of the Japanese syllabary column 100. Likewise, the utterances are categorized by using the first character as shown in the figure.

The user utterance collection 38 has a file name column 104, a user utterance column 102, and a page column 120 of a specialized server to respond to the user. For instance, a page of a specialized server to respond to the utterance "Hi" is URLa43, and a pair of the utterance "Hi" and URLa43 forms a file f044. The user utterances are gathered for each specialized server. For instance, the user utterances 110 which are linked to the chat server 24 are put together into one group, while the user utterances 120 linked to the recipe server 26 are put together into another group. The former utterances relate to general greetings and such. The latter utterances relate to cooking and recipes. The index file 36 and the user utterance collection 38 are linked together via file names. For instance, the file name f045 is recorded corresponding to the utterance "Hello" in the index file 36, and the file

name points to the file f045 in the user utterance collection 38.

As shown in Fig. 4, two pages, URLa1 and URLa2, correspond to "Hello". URLa1 will be sent to a user who first visits the chat server 24 and URLa2 is sent to a user who visits the server a further time.

Fig. 5 illustrates an internal description of the access information file 46. In this figure, the user "user1" has visited the specialized servers called "chat", "recipe", and "auction" before, while the user "user2" has already visited the specialized servers named "travel" and "PC". Therefore, as stated above, when "user2" visits the chat server 24, the chat agent starts with an utterance prepared for first-time visitors. When "user1" visits the chat server 24, the chat agent produces an utterance prepared for revisitors.

Fig. 6 is an internal structure of the chat server 24 as an example of a specialized server. A communication unit 60 communicates with the user terminal 12 and the originating server 20 via the Internet 14. The URL identified in the utterance search unit 34 of the originating server 20, for instance, URLa1 or URLa2 corresponding to the utterance "Hello" as in Fig. 4, is forwarded to an agent behavior collection 62 via the communication unit 60. The agent behavior collection 62 includes agent data 72 that describe images and action

patterns of the expert agent as well as its utterances. One page corresponding to one URL identified by the utterance search unit 34 is also provided. For instance, a page 64 for URLa1, a page 66 for URLa2, and a page 68 for URLan are provided. The pages are Web pages that not only carry the utterances of the chat agent, but also display its image and behavior, and perform services using the agent, for instance for information retrieval and such. Thus, by providing one Web page for each single utterance, fully flexible responses can be realized.

Each page has almost the same configuration, so only page 64 of URLa1 is described in detail in this figure. Page 64 of the URLa1 has an agent output unit 70, a user utterance obtaining unit 74, a specific process execution unit 76. These units are realized by using CGI or Common Gateway Interface that is a back-end process behind this page. The agent output unit 70 responds to the user utterance through the chat agent on the basis of the agent data 72. The specific process execution unit 76 performs any processes other than that of responding to utterances, for instance, retrieving information and executing various types of programs. For example, if the user utterance that brought the user to access this page is "I want to know today's news", the chat agent will search news through the Internet 14 and present it to the user. The user utterance obtaining unit 74 thereafter obtains a normal utterance

from the user, and notifies the originating server 20 of this. As a result, a new specialized server is identified by the originating server 20.

Fig. 7 shows the internal structure of the user terminal 12. A communication unit 130 communicates with the originating server 20, the chat server 24, the recipe server 26, and other specialized servers via the Internet 14. A user interface 138 is a general term for the whole structure used to encourage a user to make a decision and enabling the user to input his/her decision, and it includes a keyboard, a mouse, a display, and other types of data interfaces. A local agent output unit 132 reads local agent data 134 and forwards the data to the user via a user interface 138. The process starting utterance and normal utterances of the user are forwarded to a user utterance input unit 136 and these data are sent to the originating server 20 via the communication unit 130 and the Internet 14. The processes involved in the above-mentioned configuration of the embodiment are now described using some examples as follows.

Fig. 8 shows a screen 150 displayed when a user has activated the user terminal 12. A local agent 152 appears and says, "Welcome! Let's chat." The user inputs "Hello" in an input field 154 and presses a send button. The screen may be configured in such a manner that the input field 154 appears when the user clicks the local agent 152.

In this case, as long as the user does not click, the local agent 152 may continue chatting or encourage the user to talk by asking a question. In any case the inputted statement "Hello" is sent as a process starting utterance to the originating server 20, and the chat server 24 is identified as a specialized server on the basis of the content of the statement, and the user terminal 12 is given access to a corresponding page.

Fig. 9 shows a screen 150 displayed when the user makes an utterance. Here a chat agent 156 appears, but the same image as the local agent 152 is used in this embodiment and thus the conversation continues with no apparent seams. The chat agent 156 says, "Hello. I am a chat agent. Call me Peako." When the user inputs "Recommend a recipe" and sends it, the utterance is obtained at the originating server 20 and a page of the recipe server 26 is anew identified. The URL of the identified page is sent to the user terminal 12 and the user terminal 12 is given access to the page.

Fig. 10 shows a screen 150 displayed when the user asks for a recipe. A new recipe agent 160 appears and says, "OK! I am a recipe agent. Trust me." Then the agent asks, "What kind of recipe would you like?" The reason for this is that there could be many choices when a user asks for a recipe and it is necessary to obtain a hint to narrow the scope of the search. The user inputs "Chinese cooking" and

submits it. Although this normal utterance is sent to the originating server 20, the specialized server identified therein is still the same recipe server 26 and the user is given access to another page of the same server.

Fig. 11 shows a screen 150 displayed when the user gives a hint to narrow down the search. Here the recipe agent 160 asks, "Now, how about ingredients? Please select one" in order to specify the search further. A region 162 appears at the lower part of the screen 150, displaying several choices of ingredients, with radio buttons. Pork, beef, fish and such are given as choices. Let us say that the user selects "beef" and presses a send button.

Fig. 12 shows a screen 150 that displays a search result. Although the screen 150 of Fig. 12 is different from the screen 150 of Fig. 11, this is not because the accessed page has changed in response to the utterance, but because a page linked to the radio button "beef" has been accessed. Thus, generally speaking, by embedding predefined choices in the utterances of the expert agent, the user's intentions can be easily and reliably confirmed.

In Fig. 12, the recipe agent 160 says, "How about this?" and some recipe titles 170 such as "Fried beef with green peppers" are displayed, since the search on the Internet 14 has already been performed by the specific process unit 76 under the query criteria "Chinese dishes" AND "beef" AND "recipe", that correspond to the user's

request. These titles have links through which the user can access Web pages describing the recipes in detail. In addition, other Web sites offering Chinese recipes are displayed in a research result field 172 for the convenience of the user. In any case, the user can obtain the details of the recipes by starting from this screen 150. In this figure, another normal utterance of the user "I would like to look at flight schedules" is inputted in an input field 154. When it is sent, the originating server 20 identifies a travel agent on a travel server that is not shown in the figure and the necessary processes are initiated.

On the other hand, if the user inputs "I want to know about Egyptian palace dishes", this utterance may not be identified. In such a case, a system administrator is notified of the unidentified utterance as it is, and then the user utterance collection 38 and the index file 36 are updated. In addition, a new page to respond to the utterance is provided in the recipe server, and thereby information regarding Egyptian palace dishes is properly returned.

Although the present invention has been described by way of exemplary embodiments, it should be understood that those skilled in the art might make numerous changes and substitutions without departing from the spirit and the scope of the present invention that is defined by the

appended claims. Some such alterations are stated as follows.

Although the user utterance is performed on a text basis in the embodiment, it may be performed using speech recognition. The agent may also make utterances in voice.

Although the unidentified utterance is considered as an utterance that is not identifiable in the user utterance collection 38, if the utterance is identifiable in the user utterance collection 38 but the response of the expert agent is not complete or fails, the utterance may be called an unidentified utterance. For instance, when the specific process execution unit 76 searches for a user utterance "Recommend a recipe" and the search results are too many to satisfy the user, the utterance may be reported to the system administrator as an unidentified utterance so that the response of the expert agent can be improved.

In the embodiment, the expert agent utterance is appropriately selected according to the record of the user's access to the specialized server. Moreover, an appropriate utterance of the agent may be selected based on the user attributes. For instance, if the user is female, a relatively gentle expression may be chosen or if the user is an elder, a polite expression may be chosen.

Although the local agent 152 and the chat agent 156 have the same image in the embodiment, it is not necessary. The local agent 152 may be implemented on the originating

server 20 instead of the user terminal 12 as a process-initiating agent, for instance.

The second embodiment of the present invention is now explained. This embodiment relates to a translation technique, and it particularly relates to a translation technique using a server-client system or other systems.

There has been a well-known apparatus called an electronic dictionary in an electronic calculator. The apparatus displays an English word or other foreign words corresponding to a word inputted by a user. The conventional dictionaries in print are very heavy, while portable dictionaries have very small characters. Both are generally inconvenient for traveling on business or on holiday. However, the electronic dictionary has portability and is suitable for traveling abroad, and it can also save a space for a use at home. Therefore it has been gaining support among specific users.

Besides such a dictionary apparatus, various types of dictionaries are on sale as computer software. Although its portability depends on the hardware of the personal computer, such software made the dictionaries easier to use. For this reason, not only users who write documents in foreign language but professional translators use such a software package of dictionaries.

Such apparatus and software are designed for the use of looking up a word in dictionaries. The dictionary used

in the apparatus or the software package is originally just an electronic version of a dictionary in print, and the dictionary is edited on a word basis.

Apart from professional translators and users who write/speak in a foreign language, general users find very difficult to form words into a sentence when they look up the words in a dictionary. In that sense, the current electronic dictionaries and software packages are not a true communication tool, although it is only natural considering their purpose.

Fig. 13 shows an overall structure of a network system 3010 including a translation system 3016 according to the second embodiment of the present invention. Here a user terminal 3012 and the translation system 3016 are connected to each other via the Internet 3014.

The translation system 3016 includes an entrance server 3020 and a translation server 3024. The entrance server 3020 and the translation server 3024 may be configured as a united node within one site or may be configured as separate nodes. When the servers are separately configured, the processes can be distributed among the servers resulting in a balanced or optimized load, and additionally the system maintenance becomes easier. When the servers are configured into one body, the total hardware resources of the system can be saved. It depends on the system design and the system management policy which

configuration should be chosen.

In the figure, URLa and URLb denote respectively a network address of the entrance server 3020 and the translation server 3024. A user first accesses the entrance server 3020 in order to receive a translation service. The entrance server 3020 receives an utterance of the user and identifies the content of the utterance. When the content of the utterance is identified, the entrance server 3020 sets the address URLb of the translation server 3024 to the user terminal 3012 and the user terminal 3012 comes to access the translation server 3024. The translation server 3024 translates the content of the identified content of the utterance and sends the translated content back to the user. Next the translation server 3024 receives another utterance from the user and sends it to the entrance server 3020. At this time, the translation server 3024 sets the address URLa of the entrance server 3020 to the user terminal 3012 so that the user comes to access the entrance server 3020 again. Likewise the processes are repeated between the entrance server 3020 and the translation server 3024.

Fig. 14 shows an internal structure of the entrance server 3020. The entrance server 3020 may be an Internet service site such as a Web server or the like. In this case, the entrance server 3020 can be configured in various manners such that the main functions remains at the server

side like CGI or Common Gateway Interface, the main functions are transferred to the client side like a Java (trademark) applet or ActiveX (trademark), and an API or Application Program Interface type, that is, the main functions are provided at both the server and the client like a Java application. The translation server 3024 is the same as the entrance server 3020 in this respect. In Fig. 14, "H" indicates an utterance, "TL" a target language for translation, "R" a record of database, "UW" an unidentified utterance, that is an utterance the content of which is not identified respectively.

A communication unit 3030 of the entrance server 3020 communicates with the user terminal 3012 and the translation server via the Internet 3014. An utterance obtaining unit 3032 obtains an utterance inputted by the user and sends it to an utterance search unit 3034. The utterance search unit 3034 looks up the utterance in a user utterance collection 3038 and identifies the content of the utterance. This identification is conducted by finding a sentence corresponding to the user utterance as a whole. The identified utterance is sent to the translation server 3024 in the form of record number R, and a corresponding record in a dictionary file built in the translation server 3024 is retrieved. After identifying the utterance, the utterance search unit 3034 sets the address URLb of the translation server 3024 to the user terminal 3012.

When a sentence completely corresponding to the utterance of the user is not stored in the user utterance collection 3038, an almost similar process is conducted as in the first embodiment. Only differences are described here. The utterance for which a re-search is conducted or the utterance for which the re-searching is not successful are recorded as an unidentified utterance in an unidentified utterance file 3040, and an administrator of the translation system 3016 is notified of this via a reporting unit 3042 using an electronic mail or the like. The administrator newly registers such an unidentified utterance and a corresponding expression in the user utterance collection 3038 and the dictionary file, and then finally improves the system.

A target language setting unit 3044 obtains a target language, that is a translation language specified by the user, and passes it to the translation server 3024. The translation server 3024 thereby performs translation in a language that the user desired among many languages.

Fig. 15 is an internal structure of the user utterance collection 3038. The user utterance collection 3038 has a first character column 3050, a user utterance column 3052, and a record column 3054. The Japanese syllabary is written in the first character column 3050 and assumed utterances of users are arranged in the order of the Japanese syllabary in the user utterance column 3052.

The user utterance may be a word such as "Asa", or may be a conversational sentence or the like. The record column 3054 has a record number R of the dictionary file of the translation server 3024, and therefore it becomes an index for referring to the dictionary. In the figure, the index of the user utterance "Arigato" that means "Thank you" is R112, for instance.

Fig. 16 is an internal structure of the translation server 3024. A communication unit 3060 communicates with the user terminal 3012 and the originating server 3020 via the Internet 3014. The record number R identified at the utterance search unit 3034 of the entrance server 3020 is received at a record obtaining unit 3062 via a communication unit 3060 and passed to a corresponding expression search unit 3064. On the other hand, the target language obtained at the target language setting unit 3044 of the entrance server 3020 is also passed to the corresponding expression search unit 3064. The corresponding expression search unit 3064 retrieves a corresponding expression, as indicated by SR in the figure, in a dictionary file 3066 based on the given information, and passed it to a formatting unit 3068. The formatting unit 3068 changes the corresponding expression into a Web page or an electronic mail form, as indicated by P in the figure, and sends it to the user terminal 3012 via the communication unit 3060. An instruction obtaining unit

3070 obtains the next user utterance and sends it to the entrance server 3020, or receives a user's choice when a plurality of corresponding expressions exists, or receives a user's instruction to paste the corresponding expression in an document or an electronic mail under editing, or performs any other processes. The instruction obtaining unit 3070 ends up with causing the user terminal 3012 to access the entrance server 3020, namely URLa, in order to identify the next utterance.

Fig. 17 is a data structure of the dictionary file 3066. The dictionary file 3066 has a record column 3054, an English column 3080, a French column 3082, and other language columns that are not shown in the figure. For the user utterance "Arigato" with a record number R112, two choices are shown here respectively as its English translations and French translations. For instance, "Thank you" for a normal expression and "Thank you very much" for a polite expression are on the list of English translations so that users can select one depending on situations.

Now explain a flow of a translation service by the above-mentioned configuration. Fig. 18 shows a screen displayed when a user accesses the entrance server 3020 to receive a translation service. There is a field 3090 for the user to specify a translation language or a target language under the service title "VIRTUAL TRANSLATOR" and English is selected here. Under this field an utterance

input field 3092 is provided with a statement "Please input a sentence or word to be translated". The user inputs "Arigato" and presses a send button 3094. A series of processes by the entrance server 3020 are executed by this user action, and the target language, that is English, and a record number R112 are sent to the translation server 3024. At the same time, the access destination of the user terminal 3012 changes to the translation server 3024.

Fig. 19 shows a screen displayed when the user accesses the translation server 3024. The translation server 3024 identifies the records of expressions corresponding to "Arigato" based on the record number R112 and provides a desired translation based on the target language "English" sent from the entrance server 3020. Two translations 3096 corresponding to "Arigato" are shown with simple explanations as described above. If the user selects one from these translations by clicking, various processes can be performed by the instruction obtaining unit 3070 of the translation server 3024, such as pasting the translation into an electronic mail under editing.

Fig. 20 is a flow chart showing the above-mentioned processes. A user sets a target language (S3010). The utterance obtaining unit 3032 obtains a user utterance (S3012). The utterance search unit 3034 searches the utterance (S3014). If the user utterance is found in the user utterance collection 3038 (Y of S3016), the

translation server 3024 translates it (S3018), formats it (S3020), and then provides it to the user terminal 3012 (S3022). On the other hand, if the user utterance is not found in the user utterance collection 3038, and its content cannot be identified even by a morpheme analysis and the like (N of S3016), the utterance is recorded in the unidentified utterance file 3040 (S3024) and the system administrator is notified of it (S3026). As mentioned above, the translation system of the second embodiment can realize a translation to meet user's requirements, while maintaining a high responsiveness and improving the ease to maintain.

The third embodiment of the present invention is now explained. The translation system of the present invention can be applied to other types of applications that a plurality of users get involved in. Fig. 21 shows an entrance server 3020 for realizing a chat room where users from many countries assemble. In the figure, the same numerals are given for the components equivalent to ones of Fig. 14 and the explanations are omitted if appropriate.

A chat function block 3102 provides functions to realize a general conventional chat room, such as registering a user's handle or nickname, entering a room, administrating users who entered a room, obtaining users' chat, and broadcasting the chat. The chat function block 3102 has a user attribute obtaining unit that is not shown

in the block, and the unit obtains information indicating a user's mother tongue, as referred to as mother tongue information, as well as normal user information. The mother tongue information may be inputted by a user or it may be detected which language is used to display Web pages on the user terminal 3012. Or the mother tongue may be judged by terminal information such as OS installed on the user terminal 3012. Attribute information of all users who entered in the chat room, as referred to as members, as indicated by "UI" in the figure, especially the user's mother tongue information is transmitted to a mother tongue identifier 3106. The mother tongue identifier 3106 identifies all target languages indicated by "TL" based on the mother tongues of their members and send them to the translation server 3024.

The chat function block 3102 basically obtains the utterance "H" of each member and sends it to the utterance search unit 3034. Thus the function of the utterance obtaining unit 3032 of the second embodiment is realized inside the chat function block 3102. When a record number "R" is identified by the utterance search unit 3034, it is sent to the translation server 3024. The formatting unit 3104 receives a translation result from the translation server 3024, and selects a corresponding expression in the mother tongue of each member by referring to the member's attribute information "UI" and formats a displayed page and

returns it to the chat function block 3102. The chat function block 3102 generates different pages on a member's language basis and broadcasts the pages to each member, namely, transmits them at the same time.

The translation server 3024 of this embodiment is basically equivalent to one of the second embodiment, but the formatting unit 3104 is provided in the entrance server 3020 in this embodiment as shown in Fig. 21. Therefore the translation server 3024 does not have the formatting unit 3068 and sends a translation result obtained from the dictionary file 3066 to the formatting unit 3104 of the entrance server 3020 and the result is formatted there.

Fig. 22 illustrates a chat room that members with different nationality participate in. The names of the members such as "tom" are displayed in a member field 3122 and their conversation progresses in a main field 3120. A field 3124 for the member to enter an utterance and a submit button 3126 to send the utterance are provided at the bottom. In addition, a "other languages" button 3128 is provided.

Several members such as ken_123 are now chatting with each other in the main field 3120. The chat is displayed in Japanese and it looks as if all members are Japanese. However, "taro" is Japanese, "tom" is American, "Pierre" is French, and other members are either Japanese, American or French. The screen of Fig. 22 is displayed on the user

terminal 3012 of "taro".

In this situation, the mother tongue identifier 3106 identifies "Japanese, English, and French" as the target languages. If an utterance of a member is Japanese, the content of the utterance is identified by the utterance search unit 3034 of the entrance server 3020 and a record number R is sent to the translation server 3024. The corresponding expression search unit 3064 of the translation server 3024 identifies an English expression and a French expression of the Japanese utterance based on the record number R and the target language "Japanese, English, and French" and the expressions are sent to the formatting unit 3104 of the entrance server 3020. The formatting unit 3104 transmits page data of the screen of Fig. 22 to Japanese members such as "taro" using the mother tongue information of each member.

On the other hand, the formatting unit 3104 transmits page data of the screen of Fig. 23 to American members such as "tom". The screen of Fig. 23 is an English version of the screen of Fig. 22 and all members looks English-speaking people from the member "tom". Likewise, all members looks French-speaking people from the member "pierre", although it is not shown in the figure.

The "Other languages" button 3128 is provided on the screen as in Fig. 22 and Fig. 23. The button is used when the members want to change the screen in other languages

than their mother tongue. For instance, when the member "taro" presses the button in Fig. 22, an English service like Fig. 23 is offered.

Some alterations are now stated as follows. In the second and third embodiments, the user utterance is performed on a text basis, but it may be performed using speech recognition. In this case, the present invention may be utilized as an interpretation tool.

Although the unidentified utterance is considered as an utterance that is not identifiable in the user utterance collection 3038, if the utterance is identifiable in the user utterance collection 3038 but the translation is not complete or not satisfactory, the utterance may be called an unidentified utterance. This case is also reported to the system so that the dictionary file 3066 can be revised.

Several choices are found after translation as in Fig. 19, the formatting unit 3068 and other units may select an appropriate expression based on the user attributes. For instance, if the user is female, a relatively gentle expression may be chosen or if the user is an elder, a polite expression may be chosen.

Moreover, the system may be so configured that users can specify a tone in translation. For example, users may specify "very politely" or "friendly" and so on, and the formatting unit 3068 and other units may select a suitable expression.

Although the user utterance collection 3038 is configured on the assumption that the first user utterance is made in Japanese in the embodiments, the user utterance collection may be generated for any other languages. After judging the user's mother tongue, it can be determined which language version of the user utterance collection is used.

The translation system of the embodiments can be integrated into a user support apparatus or system. Such an apparatus or system may contain an agent to respond to a user's question, and if the agent cannot understand the user utterance, the translation process of the embodiments can be used. On the other hand, a collection of the agent's response patterns may be created for various languages so that the agent can respond to users who speak different mother tongues. Even if the agent utterances are produced in multiple languages, other data such as action patterns and images can be shared. Therefore, it is not a hard task to extend the system for multiple languages.

Although the translation is made between different languages in the embodiments, the present invention can be applied to a translation between dialects, or translating from an archaic to a modern expression, or helping a talk between different generations.

Moreover, the present invention can be applied to a real time translation service for a telephone conversation

in different languages or an international conference.

The fourth embodiment of the present invention is now explained. Fig. 24 shows an overall structure of a network system 4010 including a user supporting system 4016 according to the fourth embodiment of the present invention.

The user support system 4016 includes a chat server 4020, a recipe server 4026, and a travel server 4028 each of which is connected to the Internet 4014. Thus, the chat server 4020, the recipe server 4026, and the travel server 4028 are configured as separate network nodes, and each of these servers processes user utterances and agent utterances in respect to each specialized field. For instance, the chat server 4020 processes general greetings such as "Hello" or the like, and the recipe server 4026 processes utterances about cooking such as "Recommend a recipe", and the travel server 4028 processes utterances about travel such as "Recommend a domestic travel".

In this embodiment, the chat server 4020 is the server that is first accessed by the user who utilizes the user support system 4016. The chat server 4020 processes the initial utterance of the user. In this sense, the chat server 4020 is also referred to as "an originating server". In the following, such servers as the chat server 4020, the recipe server 4026, and the travel server 4028 are each generally referred to as a specialized server, and agents placed on these servers are referred to as expert agents.

Each of the specialized servers includes the first block which has an electronic collection of user utterances, and identifies a content of a given user utterance, and the second block which has an electronic collection of action patterns for an agent for responding to user utterances, and enables the agent to respond to the user utterance. The user utterance collection includes a general utterance library that stores general user utterances, and a specialized utterance library that stores utterances related to the specialized field of the expert agent. The specialized server identifies the general user utterances and the utterances related to its specialized field, and enables the expert agent to respond to users.

The user utterance collection of the originating server 4020 stores the specialized utterance libraries of all specialized servers in the user support system 4016. The originating server 4020 receives the utterance that any other specialized server cannot identify, and find a specialized server that can process the utterance by matching it in the user utterance collection. When a specialized server that can process the utterance is found, the process is taken over by the specialized server, and the specialized server continues to process the user utterances as long as the user talks about the specialized field.

The abstract of the process in Fig. 24 is almost the

same as in the first embodiment, and only differences are explained here.

When the user makes a new utterance, that is a normal utterance, to the expert agent, the utterance is captured and checked in the user utterance collection of the specialized server. When the content of the utterance is identified, the specialized server sends a URL to the Web browser on the user terminal 4012 to display another page within the identical server, and at the same time retrieves an agent action from the agent action collection to perform a response process. As long as the user normal utterance is identifiable at the specialized server, the specialized server repeats a sequence of processes of obtaining a user utterance, the expert agent's responding to the user by, and requesting or prompting the user to make a normal utterance.

When the content of the utterance is not identified, the utterance is sent to the originating server 4020, as denoted by URLs. The originating server 4020 identifies a specialized agent to respond to the utterance by matching it with the user utterance collection and sends the URL of the specialized agent to the user terminal 4012. Thus, the subsequent process is transferred to the specialized server and the second block of the specialized server performs subsequent response processes. The utterance that cannot be identified by the originating server 4020 is reported to

a system administrator as described below.

Thus each of specialized server converses with the user on a topic in each specialized field. Although the originating server itself as a chat server converses with the user on a topic related to a chat, the server also has a function of identifying user utterances on topics related to specialized fields of other specialized servers and allocating the access destination of the user terminal 4012 to a specific specialized server.

The advantage of this configuration is that a third party can develop a specialized server for their specialized field independently. An administrator of such a specialized server gets a general utterance library from the system administrator and develops their original specialized utterance library and agent action library. Therefore, the development of specialized servers for various specialized fields is promoted and an overall system that covers many specialized fields can be developed in a relatively short time. The general utterance library may be provided to each specialized server as package software, or a library site to offer the general utterance library may be provided and the access right to the library site may be given to the specialized server. The latter case can save an effort to provide the latest package software to the specialized servers whenever the general utterance library is updated.

Fig. 25 shows an internal structure of the originating server 4020. The originating server 4020 of this embodiment has functions similar to that of the first embodiment. Only different functions are explained here.

When an utterance is identified using the index file 4036, a file descriptor of a file describing information such as a URL of a specialized server that should respond to the utterance is identified in the index file 4036, and the file itself built into the user utterance collection 4038 is opened and a proper URL obtained.

If the URL obtained points to the specialized server, the URL is forwarded to an agent controller 4060 as an example of the second block. The agent controller 4060 forwards the URL to the browser on the user terminal 4012 via the communication unit 4030 and retrieves an agent action corresponding to the URL from the agent action collection 4062 and performs the agent action.

If the URL obtained points to another specialized server, the URL is forwarded to the browser on the user terminal 4012 via the communication unit 4030 and the user terminal 4012 in turn accesses the specialized server.

When a statement exactly corresponding to the utterance of the user has not been previously stored in the user utterance collection 4038, the procedure similar to that of the first embodiment is taken. Here only different points are described.

When the system administrator is notified of an unidentified utterance, he/she reports the content of the utterance to an administrator of a specialized server to respond the utterance and requests to develop a response process of its expert agent. The administrator of the specialized server registers anew such unidentified utterances and the URL of a page of the specialized server to respond to the utterance in the user utterance collection 4038 of their own server, and registers the indexes of the utterance in the index file 4036, and then finally designs processes including utterances for the expert agent on that page. After the development is completed, the administrator of the specialized server notifies the originating server 4020 of a new developed utterance, its index, and a URL of the page of the specialized server to respond. The administrator of the originating server 4020 registers the notified contents in the index file 4036 and the user utterance collection 4038.

Fig. 26 is an internal structure of the index file 4036. Fig. 27 is an internal structure of the user utterance collection 4038. The structure of the index file 4036 is the same as one of the first embodiment, but two separate index files may be provided respectively for the general utterance library and the specialized utterance library or one index file containing both libraries may be provided. The structure of the user utterance collection

4038 is almost same as that of the first embodiment and here the user utterances 4114 linked to the travel server 4028 are put together into one group.

Fig. 28 illustrates an internal description of the access information file 4046. As in the first embodiment, when "user2" visits the chat server 4020, the chat agent starts with an utterance prepared for first-time visitors. When "user1" visits the chat server 4020, the chat agent produces an utterance prepared for revisitors.

Fig. 29 is an internal structure of the agent action collection 4062. The URL identified in the utterance search unit 4034 of the originating server 4020, for instance, URLa1 or URLa2 corresponding to the utterance "Hello" as in Fig. 27, is forwarded to an agent behavior collection 4062 via the agent controller 4060. The structure of the agent action collection 4062 is the same as that of the first embodiment except it does not contain the user utterance obtaining unit 4074.

A library provider 4048 manages the general utterance library and provides the general utterance library to the administrators of other specialized servers off line or on line. For instance, the general utterance library can be provided off line as a software package, and can be provided on line by offering an access right for a server that stores the library. In this embodiment, when the library provider 4048 receives a request from any other

specialized server, it retrieves the general library from the user utterance collection 4038 and transmits it to the specialized server via the communication unit 4030. The library provider 4048 may send and receive a specialized utterance library as well as the general utterance library. For instance, when any other specialized server develops a new specialized utterance library, the library provider 4048 may receive the specialized utterance library and register it in the index file 4036 and the user utterance collection 4038. Thereby the maintenance of the user support system as a whole becomes easier.

Now explain the structure and behavior of the specialized servers other than the originating server 4020, such as the recipe server 4026 and the travel server 4028. The recipe server 4026 is explained here as an example, but other specialized servers are the same. The internal structure of the recipe server 4026 is almost the same as one of the originating server 4020 of Fig. 25. Therefore, a sequence of the process is explained mainly focusing on different functions from the originating server 4020.

First, when the user utterance obtained at the originating server 4020 is judged to be processible at the recipe server 4026, a URL of a page within the recipe server 4026 is forwarded and set to the browser on the user terminal. The browser accesses the recipe server 4026 and requests the agent controller 4060 to get a corresponding

page via the communication unit 4030. The agent controller 4060 retrieves the corresponding page from the agent action collection 4062 and transmits the page to the user's browser and then executes other necessary processes, as the originating server 4020 does.

Next the recipe server 4026 waits until the user makes the next utterance. When the user makes an utterance, as the originating server 4020 does, the utterance obtaining unit 4032 obtains the utterance and the utterance search unit 4034 identifies the utterance. The recipe server 4026 has a general utterance library and a specialized utterance library related to cooking and can identify general utterances and cooking-related utterances of the user, but cannot identify any other utterances. If the utterance search unit 4034 can identify the user utterance, the agent controller 4060 executes response processes. If the user utterance cannot be identified, the utterance is recorded as an unidentified utterance in the unidentified utterance file 4040, and the reporting unit 4042 sends the utterance to the originating server 4020. Then the utterance is matched with the user utterance collection 4038 in the originating server 4020 and a specialized server that should process the utterance is identified, and the specialized server in turn executes the subsequent process. When the administrator of the recipe server 4026 finds a cooking-related utterance among

unidentified utterances recorded in the unidentified utterance file 4040, he/she develops a response process to the utterance and registers it in the recipe server 4026. Thus, the agent processes can be easily enhanced. In this embodiment, the unidentified utterances are recorded in the unidentified utterance file 4040 of each specialized server and that of the originating server 4020, but may be recorded in either specialized servers or the originating server 4020.

The library provider 4048 accesses the library site that contains the general utterance library at a predefined interval, and obtains the latest general utterance library and then register it to the index file 4036 and the user utterance library 4038. The library provider 4048 also sends a new developed specialized utterance library of the recipe server 4026 to the originating server 4020. Thus each specialized server is independently maintained resulting in enhancing the user support system as a whole.

The internal structure of the user terminal 4012 is the same as one of the first embodiment. The screen displayed on the user terminal 4012 is also the same as one exemplified in the first embodiment. However in Fig. 12, when another normal utterance of the user "I would like to look at flight schedules" is inputted and sent to the recipe server 4026, the recipe server 4026 cannot identify this utterance in its user utterance collection 4038 and

sends it to the originating server 4020 as an unidentified utterance. The originating server 4020 identifies the travel server 4028 that can process this utterance by matching it with its user utterance collection. The travel server 4028 initiates the subsequent processes.

Some alterations are now stated. Although the chat server 4020 serves an originating server in this embodiment, any other specialized server may serve as the originating server, or a plurality of originating servers may be provided. Instead of a specialized server serving as an originating server, an originating server may be provided apart from specialized servers. Moreover, instead of providing an originating server, the utterance that is not identified at a specialized server may be circulated among other specialized servers and it may be inquired whether the utterance is processible at each of the specialized servers, and then a specialized server that can process the utterance may be identified.

Although the originating server 4020 identifies the user utterance and sets a URL of a specialized server's page to respond to the utterance in this embodiment, the originating server 4020 may only identify a specialized server to process the user utterance and the specialized server may identify the content of the utterance and set a URL of a corresponding page to the user terminal. Thereby the load on the originating server 4020 can be reduced.

The fifth embodiment of the present invention is now explained. Since the Internet access at home has been common recently, WWW (World Wide Web) users are growing rapidly. As it is convenient for the users at home to access to a huge amount of information from all over the world, the number of users is further increasing. It is very likely that necessary information that users want exists somewhere in the huge number of web sites. However the number of web sites or pages has become too large for users to find out such desired information.

Being aware of the above situation, the system administrators of portal sites with search engines have been trying hard to make their search methods more sophisticated by using a directory tree, for example. Therefore, the users can efficiently find necessary information out of the flood of information using search conditions such as logical OR and logical AND within a specific topic or category predefined by the portal sites.

It is, however, extremely difficult for general users to exploit highly complicated search conditions, since most of them are beginners in computers. In addition, since information available on the Web has a complicated hierarchy and in some cases it is difficult for users to find desired information out of the hierarchy. The oversupply of information may spoil its utilization as the number of Web sites is still increasing and more and more

beginners are joining the Web services.

Fig. 30 shows an overall structure of a network system 5010 including a user support system 5016 according to the fifth embodiment of the present invention.

The user support system 5016 includes a originating server 5020, a chat server 5024, a recipe server 5026, and a travel server 5028. These servers are connected to the Internet 5014. The originating server 5020 includes an electronic collection of users' anticipated utterances and an utterance identification block that identifies the content of a given user utterance. This utterance identification block is shared by other servers in the user support system, namely, the chat server 5024, the recipe server 5026, and the travel server 5028. The chat server 5024, the recipe server 5026, and the travel server 5028 each include a collection of action patterns of the first agent to respond to the utterance and have a response block that enables the first agent to respond to the user utterance within each server node.

As in the first embodiment, the originating server 5020, the chat server 5024, the recipe server 5026, and the travel server 5028 are configured as separate network nodes. In the following, such servers as the chat server 5024, the recipe server 5026, and the travel server 5028 are each generally referred to as a specialized server, and agents placed on these servers are referred to as expert agents.

The user utterance is sent to the originating server 5020 and its content is identified in the user utterance collection. Then an agent to respond to the utterance is identified according to the content and a response process is executed by the response block. An agent on the chat server 5024, as also referred to as "a chat agent", responds to general greetings such as "Hello", and an agent on the recipe server 5026, as also referred to as "a recipe agent", responds to utterances related to cooking such as "Recommend a recipe", and an agent on the travel server 5028, as also referred to as "a travel agent", responds to utterances related to travels such as "Recommend a domestic travel". Each expert agent finds out what kind of information the user wants during a talk with the user, and supports the user to search appropriate information among a large amount of available information.

In the user support system of this embodiment, while the second agent responds to the user, the first agent appears and interrupts the dialogue so that a conversation between the two agents is initiated. Through the dialogue between the agents, the ongoing process can be made visible or some alternatives can be presented to the user. Like a rapid-fire comic dialogue, such a dialogue gives fun and makes users relaxed.

For instance, the user says, "What's new?" and the chat agent responds to the user saying, "A site of a store

offering a good dumpling is open." At this time, the recipe agent reacts the key word "dumpling" and says, "Don't talk about dumplings without me". Then if the user is interested in dumplings, the user says, "Tell me a recipe for a good dumpling" and a talk with the recipe agent is carried on. Thus, when a specific keyword appears, in the dialogue, an expert agent specializing in the field automatically appears and talks to the user so that the process can smoothly continue. While the system waits for an utterance from the user, the agents may continue to talk to each other. For instance, when the chat agent says, "Don't butt in with your joke when I am talking", the recipe agent may say back, "Don't say that. Let me join" so that it could make the user relaxed.

The utterances to which the first agent reacts are not necessarily utterances related to its specialized field. For instance, while the user and the chat agent talk about going to see cherry blossoms, the recipe agent may appear unexpectedly and interrupt saying, "Pudding rather than flowers. Would you like to know how to make a good pudding?"

The abstract of the process in Fig. 30 is almost the same as in the first embodiment, and only differences are explained here.

When an expert agent responds to the user utterance, its content is sent to the originating server 5020, as

denoted by URLs. The originating server 5020 includes an additional utterance collection, that is, a collection of assumed or anticipated utterances to which other agents should respond. The agent utterance is matched with the additional utterance collection and then an agent that should respond to the utterance is identified. If an agent to respond to the utterance is not identified, the system will wait for the next user utterance. If an agent to respond to the utterance, the URL of the specialized server of the agent is forwarded to the browser on the user terminal 5012, and a response process is performed by the expert agent as it is mentioned above and the system waits until the user makes the next utterance.

When the user makes a new utterance, that is a normal utterance, to the expert agent, the utterance is captured and sent to the originating server 5020. The originating server 5020 identifies again an expert agent to respond to the utterance, and then transmits the URL of its specialized server to the user terminal 5012. Again, the following sequence is repeated:

1. the originating server 5020 identifies a user utterance;

2. the originating server 5020 identifies a specialized server appropriate to the identified utterance;

3. an expert agent on the specialized server responds

to the user;

4. any other expert agent responds to the expert agent utterance (if no other expert agents to respond is found, this step will be omitted); and

5. the expert agent requests or prompts the user to make a normal utterance.

Thus, the process always returns to the originating server 5020 and then restarts from there.

Fig. 31 shows an internal structure of the originating server 5020. The originating server 5020 of this embodiment has functions similar to that of the first embodiment. Only different functions are explained here.

In this embodiment, an utterance obtaining unit 5032 not only captures an utterance from a user and sends it to an utterance search unit 5034, but also captures an utterance from an expert agent and sends it to the utterance search unit 5034.

An additional index file 5037 is generated by arranging the anticipated utterances stored in an additional utterance collection 5039 in the order of the Japanese syllabary. As it is the case with the index file 5036, since the first character of the agent utterance is checked with this index file 5037, the search for the agent utterance can be conducted with great speed, even if the additional utterance collection 5039 is very large.

When an utterance is identified using the index file

5037, a file descriptor of a file describing information such as a URL of a specialized server that should respond to the utterance is identified in the index file 5037, and the file itself built into the additional utterance collection 5039 is opened and the proper URL obtained. The additional utterance collection 5039, as the user utterance collection 5038, has one file devoted to each utterance. The URL obtained is forwarded to the browser of the user terminal 5012 via the communication unit 5030 and the browser in turn displays a response from the expert agent.

As it is the case with the user utterance, when a statement exactly corresponding to the agent utterance is not found in the additional utterance collection 5039, the utterance search unit 5034 breaks down the agent utterance into morphemes by a known method and finds the most probable utterance from the additional utterance collection 5039 by re-searching employing a logical AND of nouns of morphemes or similar processes. Even if a probable utterance cannot be found, it is not necessary to notify the system administrator of this. It is because the user utterance must be responded by any one of expert agents, but the agent utterance does not have to be responded by another agent. It is also unnecessary to provide a large amount of utterances to which agents should respond. It will be good enough to provide a certain amount of such utterances to such an extent that another expert agent may

appear as frequently as it does not interfere with the user. In addition, the user may set a level indicating how frequently the other agents may respond to the agent utterances. In some cases, the user may prohibit the agents other than the present conversing agent from appearing on the screen.

A library provider 5048 provides the user utterance collection to a third party off line or on line. For instance, the user utterance collection can be provided off line as a software package, but in this embodiment it is provided on line via the communication unit 5030. When the library provider 5048 receives a request for the user utterance collection via the communication unit 5030, it retrieves the user utterance collection 5038 and transmits it via the communication unit 5030. At this time the index file 5036, the additional index file 5037, and the additional utterance collection 5039 may be transmitted. By offering the user utterance collection, a new development by a third party can be promoted and as a result the system as a whole can be enhanced.

When the administrator of each specialized server develops a new agent action, a URL of a user utterance and its corresponding agent action is sent to the originating server 5020. The library provider 5048 receives the information from the specialized server and registers the information in the index file 5036, the additional index

file 5037, the user utterance collection 5038, and the additional utterance collection 5039. Thereby the accuracy of the user utterance collection can be improved and the agent functions can be enhanced easily.

The internal structure of the index file 5036, the user utterance collection 5038, and the access information file 5046 are the same as those of the first embodiment.

Fig. 32 is an internal structure of the additional index file 5037. Fig. 33 is an internal structure of the additional utterance collection 5039. The additional index file 5037 has a Japanese syllabary column 5200, an agent utterance column 5202, and a file name column 5204. The agent utterances are arranged in the order of the Japanese syllabary as the user utterances are in the index file 5036.

The additional utterance collection 5039 has a file name column 5204, an agent utterance column 5202, and a page column 5220 of a specialized server to respond. For instance, a page of a specialized server to respond to the agent utterance "rainy season" is URLa255, and a pair of the utterance "rainy season" and URLa255 forms a file f703. The agent utterances are gathered for each specialized server. The additional index file 5037 and the additional utterance collection 5039 are linked together via file names. For instance, the file name f805 is recorded corresponding to the utterance "dumpling" in the additional index file 5037, and the file name points to the file f805

in the additional utterance collection 5039.

The internal structure of the chat server 5024 as an example of a specialized server is the same as that of first embodiment. The internal structure of the user terminal 5012 is also the same as that of the first embodiment.

Fig. 34 shows a screen 5150 displayed when a user has activated the user terminal 5012. A local agent 5152 appears and says, "Welcome! Let's chat." The user inputs "Hello" in an input field 5154 and presses a send button. The inputted statement "Hello" is sent as a process starting utterance to the originating server 5020, and the chat server 5024 is identified as a specialized server on the basis of the content of the statement, and the user terminal 5012 is given access to a corresponding page.

Fig. 35 shows a screen 5150 displayed when the user makes an utterance. Here a chat agent 5156 appears, but the same image as the local agent 5152 is used in this embodiment and thus the conversation continues with no apparent seams. The chat agent 5156 says, "Hello. I am a chat agent. Call me Peako." When the user inputs "Tell me today's new recipes at cooking sites" and sends it, the utterance is obtained at the originating server 5020 and a page of the recipe server 5026 is anew identified. The URL of the identified page is sent to the user terminal 5012 and the user terminal 5012 is given access to the page.

Fig. 36 shows a screen 5150 displayed when the user asks for a recipe. A new recipe agent 5160 appears and says, "OK! I am a recipe agent. Trust me" and accesses a cooking site that the user has registered and obtains some new recipes at the site. In order to prevent the user from getting bored during the search, the agent says, "I am going to search now. Wait a moment, please" to tell that searching is being executed. When the search is completed, the browser is given access to a page to display a search result.

Fig. 37 shows a screen 5150 displayed the search result. The recipe agent 5160 says, "Today's new recipes are Italian dishes. Please click for cooking details", and recipe titles 5170 obtained through the search are displayed. Each of the titles 5170 has a link to a page describing the recipe in detail. The utterance of the recipe agent 5160 is sent to the originating server 5020 and matched with the additional utterance collection 5039. As a result, it is found that a travel agent might react to the word "Italian". The browser in turn accesses a corresponding page of the travel server 5028 and the travel agent appears.

Fig. 38 shows a screen 5150 displayed when the travel agent appears. The travel agent 5180 says, "What about joining an Italian gourmet tour to taste genuine Italian cuisine?" The user may ignore the travel agent 5180 and

continue to talk with the recipe agent 5160, or may initiate a talk with the travel agent 5180.

Thus each expert agent can serve both as the second agent that mainly talks with the user and as the first agent that interrupts the dialogue between the user and the second agent.

Although the utterance identification block is shared at the originating server 5020 in this embodiment, each specialized server may include both the utterance identification block and the response block. In such a configuration, both the user utterance collection and the agent action collection can be managed independently for each specialized field, and the management and maintenance of the agent will become easier. In any configurations, a central server may be provided to process all the utterances.

Fig. 39 shows an overall structure of a user support apparatus according to the sixth embodiment. The user support apparatus of this embodiment is not a server that offers services via a network, but a stand-alone apparatus that offers services to a user who uses this apparatus. The components with the same numerals as in the fifth embodiment perform similar functions in this embodiment.

The agent on this apparatus performs functions similar to the local agent of the fifth embodiment. The agent obtains the user utterance inputted through a user

interface 5138 at a user utterance obtaining unit 5032, and identifies the content of the utterance at the utterance search unit 5034. An agent controller 5070 retrieves a page corresponding to the user utterance, which is a page stored in the agent action collection 5062 of this apparatus, and a response process is executed.

The user may converse with an external expert agent via the communication unit 5030. While the user is talking with the external expert agent, the response of the expert agent is displayed via the user interface 5138 and is captured by an agent utterance obtaining unit 5031. If the utterance of the expert agent is matched with an utterance recorded at the additional utterance collection 5039, another agent of this apparatus appears and responds to the user.

Fig. 40 shows an overall structure of the user support apparatus according to the seventh embodiment. This user support apparatus is also a stand-alone apparatus as one of the sixth embodiment. The different point is that the apparatus of this embodiment has the first agent 5300 and the second agent 5302 implemented and the utterance identification block and the response block are symmetrically provided for the first and the second agents. The first and the second agents converse with the user as the expert agents of the fifth embodiment. While the first agent is mainly talking with the user, the second agent

timely reacts to the dialogue. On the other hand, while the second agent is mainly talking with the user, the first agent timely reacts to the dialogue.

Although the user utterance collection and the additional utterance collection are separately provided in this embodiment, the additional utterance collection may be incorporated into the user utterance collection. In this case, the user utterance and the agent utterance may be matched with the user utterance collection without discriminating between the two, when the process of the utterance identification block comes to at least a final stage.